

# Sorting out the skills gap

Analyzing the evidence for a shortage of middle-skill workers in the manufacturing and healthcare industries in the Portland region



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## EXECUTIVE SUMMARY

The skills gap has garnered significant attention in popular discourse, research initiatives and public policy, both in the Portland region and across the country. Simultaneously, fewer and fewer people in the Portland region are earning self-sufficient incomes. The manufacturing and healthcare industries are often cited as promising pathways to self-sufficiency due to shortages of workers in middle-skill, middle-wage occupations. But the magnitude and distribution of worker shortages in these industries is far from certain, and alternative factors to explain hiring challenges—such as employer practices—are supported by some of the evidence.

Existing skills gap research typically uses a single indicator of skill shortages, such as employer surveys, wages, vacancy durations, or training capacity. The purpose of this paper is to analyze the strengths and weaknesses of each of these measures, synthesize a set of findings from the available evidence, and point to future research directions. The paper concludes with the following seven findings:

### MANUFACTURING

- 1 *Shortages of skilled production workers may be less severe than often claimed, but could grow more severe in the future.*
- 2 *Hiring difficulties may be more severe for a subset of firms and occupations*
- 3 *Hiring difficulties can be driven by human resource practices as well as worker shortages.*
- 4 *The skills gap should be reframed as a training gap.*
- 5 *Employer co-investment is a promising model for manufacturing workforce strategy*

### HEALTHCARE

- 1 *Skill surpluses may be more damaging than skill gaps.*
- 2 *Skill shortages are more likely in technician and community-oriented roles.*

There is fertile ground for future research that expands upon these findings to produce more detailed analysis for particular occupations, or investigate alternative strategies and models for addressing skills gaps.

## INTRODUCTION

There have been a number of research efforts and a lively discourse around the “skills gap” notion in the Portland region over the last several years. In November of 2013 The Oregonian Editorial Board warned that “the cost of Oregon’s skills gap adds up” and cites looming shortages of workers in a range of fields, including high tech, science, engineering and the skilled trades.<sup>1</sup> America’s Edge, an education lobbying firm based in Washington D.C. but with a satellite office and supporters in Oregon, advocated for a sweeping expansion of career and technical education in their 2013 report *Oregon Must Compete*.<sup>2</sup> The Workforce Alliance—another national advocacy group—calls for the state to close the skills gap by focusing on *Oregon’s Forgotten Middle-Skills Jobs*.<sup>3</sup> Both the Vancouver Business Journal and Oregon Business Magazine published in-depth accounts of a skills gap in STEM (Science, Technology, Engineering and Math) occupations in 2013, positioning skilled worker shortages as one of the fundamental economic challenges facing the region now and into the future.<sup>4 5</sup>

The skills gap isn’t all talk: the public and private sectors have devoted significant attention and resources to the issue. The region won a \$5 million federal grant in 2007 under the Workforce Innovations in Regional Economic Development (WIRED) program.<sup>6</sup> WIRED produced a number of insights that became the basis for future workforce development strategies, such as aligning training curricula across the region, measuring supply and demand for manufacturing jobs, and mapping where resources are spent on workforce development. This work positioned the region to attract additional federal grants in 2011 and 2012 to help pay for training programs under the Jobs and Innovation Accelerator program. The WIRED program evolved into the Columbia-Willamette Workforce Collaborative (CWWC), an effort to formalize cooperation between the three workforce investment boards that operate in the region. The CWWC focuses on industry clusters that are strategically important to the region: advanced manufacturing, healthcare, clean tech and high tech.

Oregon statewide policy has also dedicated significant attention to the skills gap issue; Governor Kitzhaber released in 2012 the “40-40-20” strategy, a goal that states by 2025 all adults in Oregon will have

1 The Oregonian Editorial Board. (2013, November 13), The cost of Oregon’s skills gap adds up: Editorial Agenda 2013. *The Oregonian*.

2 America’s Edge. (2013). *Oregon Must Compete*. Washington D.C.: Author.

3 The Workforce Alliance. (2009). *Oregon’s Forgotten Middle Skill Jobs*. Washington D.C.: Author.

4 Gilmore, J. (2013, May 3). Land here, learn here. *Vancouver-Southwest Washington Business Journal*.

5 Bell, J. (2013, April 29). The STEM shortage. *Oregon Business Magazine*.

6 WIRED Northwest (2008). *About WIRED Northwest*. Retrieved at: <http://www.wirednw.org/Home/tabid/36/Default.aspx>

a high school diploma or GED, 40% will have an associates degree or post-secondary credential, and 40% will hold a bachelors degree or higher.<sup>7</sup> The expansion of the Career Pathways program, short-term post-secondary certificates, is one major strategy for achieving this goal already underway.

Linking into this collective discourse and effort is not an easy task. The skills gap seems to be a straightforward idea with straightforward implications: firms cannot find workers for well-paying jobs because not enough workers have the skills that firms need. Firms then struggle with worker shortages, and some workers simultaneously struggle to make ends meet in low-skill, low-wage jobs. Yet, even a very cursory review of the discourse on the skills gap will uncover number of narratives that complicate or even contradict this story.

Some claim that the skills gap is so pervasive that it is the underlying cause of continued high unemployment in the wake of the Great Recession; the skills gap is used as shorthand for a structural mismatch in the labor market between skills in demand and skills in supply.<sup>8</sup> Others refute this view, pointing to a wide range of economic indicators that do not support a structural mismatch, but do offer evidence that the slow recovery is a largely cyclical phenomenon.<sup>9</sup> Some assert that there is no skills gap for the national labor force as a whole, but there are real shortages in particular regions for particular occupations or industries.<sup>10</sup> The skills gap term is also employed to describe what is seen as a generally misguided approach to secondary and post-secondary education in the United States, one that too heavily favors academic skills needed for college over practical skills needed for the workplace. Others shift the focus to employer practices to explain the perceived shortages, such as unreasonably high screening criteria, insufficient pay, or the unwillingness or the inability to raise wages or invest more in training.<sup>11 12 13</sup> Despite these varying interpretations, the skills gap has become a catchall term for labor market issues, a convenient way to package a wide range of diagnoses and prescriptions to deeply felt economic challenges.

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7 Oregon University System. (2012). *From Goal to Reality: A Report on Strategies to Meet Oregon's 40-40-20 Education Goals*. Portland, OR: Author.

8 Dimon, J. and Seltzer, M. (2014, January 5). Closing the Skills Gap. *Politico Magazine*.

9 Shierholtz, H. (2014, January 23). Is There Really a Shortage of Skilled Workers? *Economic Policy Institute - Commentary*.

10 Boston Consulting Group (2013). *The U.S. Skills Gap: Could it Threaten a Manufacturing Renaissance?* Boston, MA: Author. p. 8

11 Capelli, P. (2014). *Skill Gaps, Skill Shortages, and Skill Mismatches: Evidence from the U.S.* (Working Paper No. 20382. National Bureau of Economic Research.

12 Rampell, C. (2013, March 6). With Positions to Fill, Employers Wait for Perfection. *The New York Times*.

13 Irwin, N. (2014, December 10). Employers Will Have to Raise Wages. They Just Don't Know It Yet. *The New York Times*.

The contours and causes of the skills gap are elusive. What specific type(s) of skills are perceived to be missing, and for which types of jobs? How do we truly know there are not enough workers with these skills? What is the root cause or causes of these perceived skill shortages: insufficient or ineffective public investment in training, insufficient private investment in training, or even ineffective human resource strategies on the part of firms? The purpose of this paper is not to answer these questions definitively. Rather, we aim to provide a theoretical grounding in the topic and analyze the empirical evidence available pertaining to the skills gap in two key industries in the region: manufacturing and healthcare. We hope that the analysis and implications presented here will enable a wider audience to engage effectively with local workforce development issues. As we argue in this paper, aligning skills in demand with the skills of the workforce requires extensive and ambitious collaborations between firms, government agencies, policymakers, training institutions, non-profit leaders and workers. Some of this work is already underway, but it cannot be done effectively if all partners and stakeholders are not equally informed on what the skills gap means for both key industries and low-income workers in the Portland region.

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### **Why manufacturing and healthcare?**

Manufacturing and healthcare are strategically important industries to the Portland region. Together, the two industries account for nearly a quarter of all jobs in the region, and employment grew by 12 percent between 2003 and 2014.<sup>14</sup> Future employment projections are promising for both industries; manufacturing is experiencing a domestic resurgence after many years of decline and healthcare is projected to continue to expand due to the aging population, health system reform and technological change. Perhaps most importantly, there are a number of occupations within these industries that pay relatively high wages yet do not require a bachelor's degree.<sup>15</sup> Work experience, an apprenticeship, short-term credentials, or an associates degree can open up promising career paths and the earnings potential to support a family for individuals without any education beyond a high school diploma or GED. Yet, healthcare and manufacturing are often cited among the industries that struggle to find skilled workers. This can be especially damaging to manufacturing firms that operate on lean profit margins and cannot afford to slow down output due to unfilled job vacancies. Finally, these industries have been the focus for a number skills gap-related research efforts at the regional, state and national level recently. There is an opportunity to clarify and synthesize these findings—which sometimes contra-

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<sup>14</sup> U.S. Census Bureau, Longitudinal Employer-Household Dynamics, Quarterly Workforce Indicators (2003-2014). *Employment by Metropolitan Statistical Area by Industry* (data file).

<sup>15</sup> Morehead, L. and Martin, S. (2014). *Demographic Analysis of the Manufacturing, Healthcare and Skilled Trades Industries*. Portland, OR: Institute of Portland Metropolitan Studies.

dict—so regional leaders can more confidently interpret their implications and potential strategies for addressing skill development in these industries.

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### What do we mean by skills?

Skills are multi-dimensional, yet skills research often adopts simplistic definitions of skills or do not define the type(s) of skills in question. For our purposes it is useful to think of skills in three broad categories: occupationally or industrially specific skills, academic skills (primarily reading, writing and math), and non-cognitive or interpersonal skills. A fundamental challenge of workforce research in the United States is that there are not measures for these many dimensions of skill. Extensive data on basic academic skills are available through the education system, but there are no universal measures of interpersonal or non-cognitive skills, such as ability to work in teams, communicate effectively or show up to work on time. There are not nationally consistent measures of occupational skills either, though some occupations do certify skills and knowledge and some require a license to practice. We are concerned primarily with occupational or industrially specific skills in this analysis, as they are usually requisite for employment in the higher-wage jobs in these two industries. In the absence of direct measures of these skills, a number of other indicators are used to assess the extent to which there is a shortage of skilled workers.

## THE MANUFACTURING SKILLS GAP

### HOW IS THE MANUFACTURING SKILLS GAP MEASURED?

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### Employer surveys

One of the most common and well-publicized methods of measuring skill shortages is to survey firm managers and executives. These surveys typically ask employers if they believe there is a shortage of workers, if they have difficulty filling job vacancies, or the types of skills they perceive to be missing from the labor force. The U.S. Manufacturing Institute, a national industry association, conducted a survey of around 1,000 manufacturing firm executives in 2011 and again in 2014. The results revealed that a great majority of manufacturing firm executives—83 percent in 2011, 79 percent in 2014—believes there is a moderate to severe shortage of skilled production workers in the United States.<sup>16</sup><sup>17</sup> Skilled production workers typically include machinists, operators, craft workers, welders, millwrights, distributors and engineering technicians, among other occupations that require some post-secondary training or work experience but

<sup>16</sup> Accenture. (2014). *Out of Inventory: Skills Shortage Threatens Growth for U.S. Manufacturing*. Washington D.C.: Manufacturing Institute. p. 5

<sup>17</sup> Deloitte. (2011). *Boiling Point? The Skills Gap in US Manufacturing*. Washington D.C.: Manufacturing Institute. p. 7



National and regional surveys find that many employers believe there is a severe shortage of skilled production workers

less than a bachelor's degree. The survey also linked worker shortages to real financial losses for the great majority of firms: at least 80 percent of firms had to either reduce output or increase overtime to compensate for the lack of skilled talent.<sup>18</sup> On the regional level, the Columbia-Willamette Workforce Collaborative (CWWC) surveyed over 100 local manufacturing firms in 2012 and found that 68 percent of firms anticipate that skilled production jobs will be the most difficult-to-fill compared to all other manufacturing jobs over the following three years.<sup>19</sup> About half of all firms believe that a lack of new entrants to the industry—a potential underlying cause for jobs being difficult-to-fill—is among the top three most important challenges faced by manufacturers in the region.<sup>20</sup>

These are startling statistics at first glance—and they generally support the claim that there are not enough workers with the skills that the industry needs—but how do we know that the manufacturing industry in particular experiences greater worker shortages than other industries? It is plausible that similar shares of employers perceive shortages of skilled workers in many other industries, if not all employers in all sectors. Policymakers might choose to focus on manufacturing solely for its importance as an economic base, but this justification would be more compelling if there was clear evidence that manufacturing firms are facing more severe worker shortages than firms in other industries. Employer survey findings would be more meaningful in a comparative context.

No surveys have been conducted of all employers in the Portland region about their perceptions of the labor force, and no national survey asks these questions directly. However, an annual survey administered by the Oregon Employment Department (OED) asks employers to estimate the number of job vacancies they found “difficult-to-fill” over the previous quarter. One could interpret that difficulty filling job vacancies is the result of a shortage of qualified applicants, though there are other interpretations that we will take up later. Assuming that difficulty filling job vacancies reflects worker shortage, then there is some evidence that manufacturing firms confront greater challenges finding skilled production workers than other industries. Production occupations were found to be the most difficult-to-fill job vacancies of any occupational category in the state in the 2012 employer survey. Production jobs represented about 6.5 percent of all job vacancies, but over 10 percent of all difficult-to-fill

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18 Accenture. (2014). *Out of Inventory: Skills Shortage Threatens Growth for U.S. Manufacturing*. Washington D.C.: Manufacturing Institute. p. 7

19 Gilmore Research Group. (2012). *Manufacturing Workforce Survey*. Portland, OR: Columbia-Willamette Workforce Collaborative. p. 1

20 *ibid.* p. 13

vacancies.<sup>21</sup> However, production occupations dropped to the third most difficult-to-fill occupational category in the 2013 employer survey; personal care and transportation occupations overtook production with the greatest share of all difficult-to-fill vacancies. Production jobs represented about 8 percent of all job vacancies, but 9 percent of difficult-to-fill vacancies.<sup>22</sup> Four other occupational categories had a higher share of their total vacancies reported as difficult to fill, but the total number of difficult-to-fill vacancies in each of these individual occupational groups was lower than for production occupations.

This Oregon Employment Department survey generally supports the claims that manufacturers have more trouble recruiting skilled workers than many other industries, with some caveats. The decrease in the share of manufacturing jobs that were difficult-to-fill between 2012 and 2013 might indicate that hiring difficulties are at least partially cyclical in nature. Manufacturing gross domestic product (GDP) grew by 19 percent in 2010 and 6.6 percent in 2011 before cooling off at 5.4 percent in 2012 and 5 percent in 2013.<sup>23</sup> The higher share of employers finding job vacancies difficult-to-fill in 2012 might indicate a delayed labor market adjustment to the spike in demand in 2010 and 2011. That is, shortfalls in the supply of skilled workers were a temporary consequence of a significant jump in demand, as workers need time to get the training and certifications that grew in demand. These cyclical factors might explain a portion of the hiring difficulties of the industry, but production jobs remained more difficult to fill than many other occupations in 2013—after two years of slower growth rates—so it is plausible that structural factors explain at least part of the hiring difficulties in manufacturing.

Reports of difficulty filling positions do not necessarily indicate worker shortages

There are a few broader issues with using employer surveys as a reliable measure of a shortage of skilled workers, however. Interpretations of “difficulty” and “shortage” can vary substantially across survey respondents. Individual hiring managers and firms may have a wide range of standards for how many qualified applicants they need for any one position in order to feel confident there are enough applicants to choose from. Perhaps more importantly, perceptions of hiring difficulty or a shortage of applicants are also likely to be relative to a hiring manager’s own experience recruiting for other occupations within the industry. Lower skill production jobs were reported to be far less difficult to fill in the OED survey than higher skill production jobs. Only 35 percent of vacancies for production helpers—the production occupation with the second-largest num-

21 Nelson, J. (2013). *Two-Fifths of Oregon’s Job Vacancies are Difficult to Fill*. Salem, OR: State of Oregon Employment Department. p. 6

22 Oregon Employment Department. (2013). *Oregon Job Vacancy Survey*.

23 Bureau of Economic Analysis (2010-2013). *Gross domestic product by state by industry*.

ber of vacancies in 2013—were considered difficult to fill, a lower share than the 48 percent of vacancies that were difficult to fill across all occupations in all industries.<sup>24</sup> The overwhelming majority of production jobs do not require any education beyond a high school diploma. Relative to these lower skill occupations, the more specialized skill occupations may be perceived by hiring managers as more difficult-to-fill or that there is a greater shortage of these workers. We cannot be certain that these occupations are relatively more difficult to fill than other higher skill occupations in other industries, however. The subjectivity of what constitutes a sufficient number of number of qualified applicants and how difficult a job is to fill—both within the manufacturing industries and across all industries—are weaknesses of these types of employer surveys as reliable measures of the skills gap.

Firms that require more advanced skills or smaller firms report more difficulty filling positions

A research initiative at MIT sought to remove some of this subjectivity by improving the design of the employer survey. The survey asked for more objective measures of hiring difficulty, such as the duration of vacancies over the previous year. Many firms—41 percent—still reported difficulty finding skilled workers, but the median length of a job vacancy was only four weeks, and less than ten percent of firms had vacancies that lasted longer than 12 weeks.<sup>25</sup> About 65 percent of firms had no vacancies at the time of the survey. The survey also asked about the effects of any perceived skill shortage, and only 16 percent of firms responded that the “lack of access to skilled workers is a major obstacle to increasing financial success.”<sup>26</sup> There were patterns among the firms that either had long-term vacancies, reported difficulty finding skilled workers, or believed that lack of access to skilled workers was causing financial harm. These firms tended to be smaller, to require advanced math or reading capabilities, or to require very specialized skills. These findings point to a less severe skill shortage than either other national surveys or the state and regional surveys conducted by OED and the CWWC, one in which a minority of firms are experiencing a skill shortage. Yet, those firms that do face hiring difficulties are grappling with a real threat to their profitability and growth.

Lastly, the available employer survey data do not isolate the underlying causes of firm’s hiring challenges. Even if we assume that manufacturers are indeed having more trouble filling jobs than most other industries, a shortage of skilled workers is only one potential cause of this challenge. Several alternative explanations should be considered. There may be a sufficient number of skilled workers available,

24 Oregon Employment Department. (2013). *Oregon Job Vacancy Survey* (data file).

25 Osterman, P. and Weaver, J. (2011). Skills and Skill Gaps in Manufacturing. In Locke M. and Wellhausen, R. (Eds.), *Innovation in the Production Economy*. Cambridge, MA: MIT Press.

26 *ibid.*

but the firm's recruiting strategies are not effective at identifying these workers or persuading them to apply. Some firms may require unreasonably high standards of work experience or certification that screen out candidates that could be successful with a small amount of training. This issue may be exacerbated by the use of automated digital screening of online applications. Firms may look for the perfect candidate that requires no training because they fear that investments in training will be lost if the employee leaves the company. They may also be unable to invest sufficiently in training due to increasingly global competition, slim profit margins and lean operating processes that leave little room for error or delay. These same forces may be limiting the capacity of firms to invest time and money to enhance their recruitment strategies or build partnerships with community colleges, workforce organizations or other firms experiencing similar challenges.

In short, employer strategies and practices are plausible explanations for hiring difficulties, and could even explain survey findings that some firms have more difficulty finding skilled workers than other firms do. This is not to say that those firms that are struggling have the ability to change their practices; wider economic forces may severely constrain their capacity to adapt. In any case, the employer survey data available do not isolate the effect of each of these underlying causes, so we cannot conclude that hiring difficulties are exclusively driven by worker shortages.

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**Economic indicators: production output and wages**

Economic indicators such as production output and wages can potentially provide more objective evidence for a shortage of skilled workers than employer surveys. If firms are reducing production output as a result of unfilled vacancies or increasing wages to attract more skilled workers then it is plausible that worker shortages are driving these trends. On both counts, however, the available data do not support widespread shortages of skilled manufacturing workers, though further research is warranted.

To measure production output we must still rely on employer surveys, though there are at least three surveys that ask similar questions. Production output fluctuates with demand, so surveys are required to attempt to isolate the effect of worker shortages on production output. The U.S. Manufacturing Institute survey found that 87 percent of firms had to increase cycle time—the time it takes to complete a manufacturing process—and 88 percent of firms had to increase down time—the time when the process is inoperative—due to a lack of skilled workers.<sup>27</sup> A problem with this question is

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<sup>27</sup> Accenture. (2014). *Out of Inventory: Skills Shortage Threatens Growth for U.S. Manufacturing*. Washington D.C.: Manufacturing Institute. p. 7

No more than 14 percent of manufacturers have cited insufficient supply of labor as a reason for operating below capacity in every quarter in the last decade

that it does not specify the time period when the shortage occurred. We are concerned with understanding the share of manufacturers experiencing a shortage at any given time, not the share of manufacturers that have ever experienced a shortage of workers at any point in their history. Measuring over such a broad time frame distorts the degree to which a shortage of skilled workers is an ongoing problem, because we cannot know if the firms dealt with a shortage for several days or for several months. A better measure is the share of firms that have experienced a shortage at any given time, or at any given point over a more limited time frame. The MIT survey estimated that only 8 percent of firms had a long-term vacancy that required them to cut back production at the time of taking the survey.<sup>28</sup> A yet more comprehensive source, the Quarterly Survey of Plant Capacity, administered by the U.S. Census Bureau, asks manufacturers their reasons for operating below capacity in the last quarter. No more than 14 percent of manufacturers have cited insufficient supply of labor as a reason for operating below capacity in every quarter in the last decade.<sup>29</sup> The share of firms that reported labor shortages as a factor holding back production averaged just 7 percent in 2013 and 2014.<sup>30</sup> Taken together, this indicates a very small share of manufacturers experience shortages that cause them to reduce production at any given time. This could indicate that the same small share of manufacturers are experiencing shortages on an ongoing basis, but it is more likely that different manufacturers are cycling into this small share of firms that are reporting shortages at any given time, so shortages are not an ongoing issue for most firms.

If shortages of skilled production workers are as severe as those reported by some surveys, then we would expect wages to increase for these occupations, following the basic principles of supply and demand. A shortage of qualified applicants should lead firms to raise wages to attract more talent; as noted above, however, some manufacturing firms may be constrained by lean profit margins and unable to raise wages substantially. A national analysis of payroll data was completed by the Boston Consulting Group in 2013 in an attempt to assess the size of the manufacturing skill gap. The analysis found that wages for skilled production workers in the manufacturing industry grew at average annual rate of 2.5 percent between 2005 and 2010, or about the same rate as inflation.<sup>31</sup> Wages did not outpace inflation by more than 2 percent for the last three decades, an indication that wages are relatively stagnant and do not provide compelling evidence

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28 Osterman, P. and Weaver, J. (2011). Skills and Skill Gaps in Manufacturing. In Locke M. and Wellhausen, R. (Eds.), *Innovation in the Production Economy*. Cambridge, MA: MIT Press.

29 U.S. Census Bureau (2004-2014). *Quarterly Survey of Plant Capacity* (data file).

30 *ibid.*

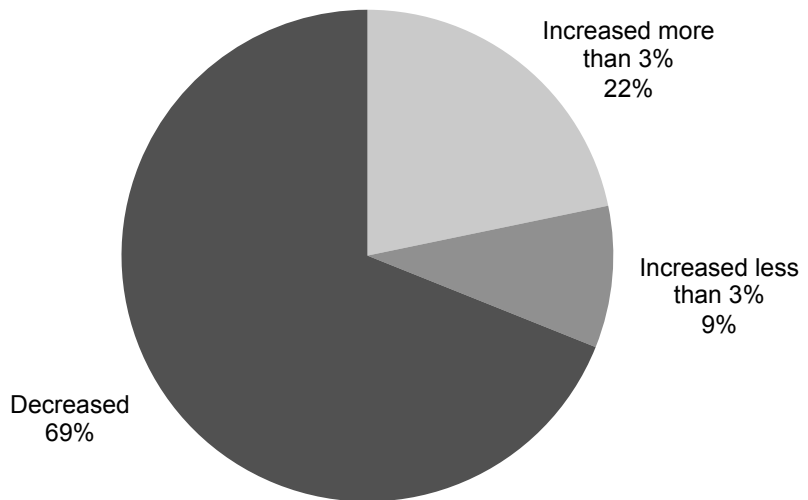
31 Boston Consulting Group (2013). *The U.S. Skills Gap: Could it Threaten a Manufacturing Renaissance?* Boston, MA: Author. p. 8

of a general skill shortage. This payroll data was used to estimate a shortage of 80,000 to 100,000 workers, or about 1% of total manufacturing industry employment and 8% of the industry's skilled labor force.<sup>32</sup> The skills gap is not yet a national problem, the study concluded, but there are localized shortages in specific occupations in specific regions. Five of the top fifty metropolitan areas have a moderate to severe shortage of skilled production workers, but Portland was not identified as one of these regions.

Most production occupations experienced stagnant or declining wages over the last decade

An analysis of average and median wage data for all production occupations in the Portland metropolitan area from 2004 to 2013 finds largely similar results: most production occupations experience stagnant or declining wages, but a few occupations are seeing wage gains. The median hourly wage for all production occupations dropped from \$17.21 per hour in 2004 to \$16.49 per hour in 2013, a decrease of 4.2 percent in inflation-adjusted terms.<sup>33</sup> Occupations that saw median wages decline represent about 69 percent of total employment of production workers (Figure 1).<sup>34</sup> Occupations with median wage gains of less than 3 percent represent about 9 percent of total employment, and those that experienced wage gains of greater than 3 percent account for roughly 22 percent of production jobs.<sup>35</sup>

**Figure 1.** Share of Production Employment by Change in Median Hourly Wage, 2004-2013, Portland MSA



Source: Bureau of Labor Statistics (2004-2013), Occupational Employment Statistics

<sup>32</sup> Boston Consulting Group (2013). *The U.S. Skills Gap: Could it Threaten a Manufacturing Renaissance?* Boston, MA: Author. p. 8

<sup>33</sup> U.S. Bureau of Labor Statistics. (2004-2013). *Occupational Employment Statistics* (data file). Adjusted to 2013 dollars using the Consumer Price Index for Western Urban Areas.

<sup>34</sup> *ibid.*

<sup>35</sup> *ibid.*

Occupations with the highest median wage increases tend to be specialized machine operators and craft workers (such as cabinet makers, upholsters, bakers, and tailors). However, two less specialized occupations were among the jobs with the highest wage gains over this period: team assemblers and production helpers saw median wage gains of 12.5 and 3.7 percent, respectively.<sup>36</sup> These two jobs account for 8.5 percent of total production employment and require no education beyond high school, but do require short or moderate term on-the-job training. These gains, however, could be an indication of an aging workforce in these occupations, as workers generally earn more with more years or experience. This is consistent with regional firm survey data; employers cite future retirements of skilled production workers as one of the top challenges facing the industry.<sup>37</sup> This is also consistent with the statewide survey of difficult-to-fill positions; production helpers and team assemblers were not considered more difficult to fill than the average occupation, which does not support the idea that rising wages are an indication of worker shortages.<sup>38</sup> Interestingly, two occupations often cited in shortage—welders and machinists—saw stagnant or declining median wages over the last decade. Median wages for welders grew by less than 1 percent, and median wages for machinists dropped substantially, by 9.1 percent.<sup>39</sup> Median wages of programmers and operators of computer-controlled machine tools also dropped by about 10 percent.<sup>40</sup>

Overall, this analysis of median wages for production occupations does not support the notion of widespread shortages of skilled production workers. The majority of production workers saw wages decline over the last decade, including many occupations considered to be high or medium skill. Of the minority of workers that did experience wage gains, it is unclear if it is driven by firms raising wages in response to shortages or general aging of the workforce. If there were a substantial supply of younger workers with these skills, however, we would expect firms to hire more of these young workers over more experienced workers, driving down median wages. This pattern of wage growth among some skilled production occupations does seem to lend support to the notion that shortages may not be severe currently, but could become more severe as experienced workers leave the workforce.

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36 U.S. Bureau of Labor Statistics. (2004-2013). *Occupational Employment Statistics* (data file). Adjusted to 2013 dollars using the Consumer Price Index for Western Urban Areas.

37 Gilmore Research Group. (2012). *Manufacturing Workforce Survey*. Portland, OR: Columbia-Willamette Workforce Collaborative. p. 13

38 Oregon Employment Department. (2013). *Oregon Job Vacancy Survey* (data file).

39 U.S. Bureau of Labor Statistics. (2004-2013). *Occupational Employment Statistics* (data file).

40 *ibid.*

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## Occupational supply and demand analysis

Another approach to measuring the skills gap is to directly compare supply and demand for an occupation. There are a number of methodological challenges to this approach, however; only one study has attempted to do this for the manufacturing industry in the region. Consulting firm ECONorthwest performed a supply-demand gap analysis for the Workforce Innovations in Regional Economic Development (WIRED) initiative in 2010. The study defined labor supply somewhat narrowly—as the number of completers of educational programs targeted towards a specific occupation, largely in community colleges—while demand was defined as projected annual openings in that occupation. The number of manufacturing-related training program completers was about 96 percent of projected openings, though some variation existed across specific occupations.<sup>41</sup> The authors concluded that the regional training system had adequate capacity to meet demand for middle-skill manufacturing jobs through 2016.

Estimating workforce supply is a highly uncertain exercise due to data validity and reliability challenges

The challenge with this method is that defining and measuring workforce supply is not as simple as the number of completers of training programs in the region. First, as the ECONorthwest report notes, not all manufacturing program completers seek jobs in the industry. Some are hired in other industries because their skills are transferable, such as welders. Others move out of the region, enlist in the military, continue their education, or elect to take care of family and exit the labor force. An analysis of the middle-skill workforce in Washington found that only 68 percent of program completers even remain in the workforce.<sup>42</sup> The authors of the analysis used interviews and anecdotal evidence to estimate that about 30 percent of manufacturing program participants are actually hired within the industry.<sup>43</sup> Thus, the net number of program completers that enter the labor pool from which manufacturers are hiring could actually be less than the projected job openings.

Workforce supply is not only a function of the number of individuals completing educational programs and entering the workforce in that region in that year, however. There is often a substantial pool of unemployed job seekers that should be included in any accounting of the total supply. Predicting unemployment and job seeker rates for each occupation in the future is difficult, but estimates of unemployed workers in an occupation can be used to estimate the degree of latent supply within an occupation.<sup>44</sup> Another source of supply is

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41 ECONorthwest (2010). *Manufacturing Workforce Audit*. Portland, OR: Workforce Innovations in Regional Economic Development (WIRED). p. 56

42 Washington Student Achievement Council, State Board for Community and Technical Colleges, and Workforce Training and Education Coordinating Board (2013) *A Skilled and Educated Workforce*. Olympia, WA: Author. p. 31

43 *ibid.* p. 74

44 Wilson, B. (2014). *How Many More Skilled Workers Do We Need? Using Supply and Demand Reports*



incumbent workers. Workers already working within the firm but in a different occupation may be promoted or retrained for the occupation in need, or the firm may hire a worker employed by another firm. Additionally, in-migrants to the region may have the skills to compete for jobs in a particular occupation, creating another source of labor for the supply pool. The occupational composition of those entering the state can be estimated in order to project their effect on labor force supply for any particular occupation, but this raises a larger policy issue. There are costs and benefits to relying on in-migration to fulfill workforce needs. The Oregon Employment Department's model for prioritizing occupations for education investments deprioritizes occupations for which in-migration is expected to be a major source of new workers.<sup>45</sup> Recent skills gap analyses in Colorado and Washington did not attempt to adjust for in-migration, as policymakers preferred to produce enough graduates in the state to meet in-state demand.<sup>46</sup> Regardless of policy choices related to in-migration, workers that move to the region likely do represent a substantial source of skilled workers.

Measuring supply is difficult: estimating the number of program completers who leave the labor force and unemployed, incumbent and in-migrant workers for every occupation is a highly uncertain exercise. Researchers face a risk of creating "false precision" in any analysis that attempts to directly measure the supply and demand for every occupation. The ECONorthwest analysis from 2010 weighed this risk while tentatively concluding that the regional training system had adequate capacity to meet demand for skilled production occupations through 2016. Given that most of the unmeasured populations in this analysis would add to the workforce supply, it is reasonable to conclude that supply is more likely to be in line with or greater than demand. Methodological doubts aside, this analysis is inconsistent with a generalized shortage of skilled production workers.

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*for State Workforce Planning*. Washington D.C.: National Skills Coalition. p. 9

<sup>45</sup> Oregon Employment Department (2012). *Training Oregonians for the Right Jobs: A Method to Prioritize Occupational Training*. Salem, OR: Author. p. 3

<sup>46</sup> Wilson, B. (2014). *How Many More Skilled Workers Do We Need? Using Supply and Demand Reports for State Workforce Planning*. Washington D.C.: National Skills Coalition. p. 9

## WHAT DOES THE EVIDENCE TELL US ABOUT THE SKILLS GAP IN MANUFACTURING?

1

### **Shortages of skilled production workers may be less severe than often claimed, but could grow more severe in the future**

The evidence reviewed does not support a narrative of shortages of workers for all skilled production occupations and all manufacturing firms

The U.S. Manufacturing Institute’s national survey of employers—and some popular coverage of the skills gap—makes the case that there is a widespread shortage of skilled production workers, with dire consequences for the profitability and productivity of the industry. The majority of the evidence for a shortage of skilled production workers in the Portland metropolitan area is inconsistent with this narrative. Statewide survey data indicate that not all skilled production occupations are considered “difficult to fill” by firms, and that perceptions of shortages may be partially attributable to fluctuations in demand, which are difficult, if not impossible, for workers and the training system to respond to in the short term. Median wage changes over the last decade fall into a similar pattern: a generalized shortage would likely drive up median wages for most occupations, but median wages for most production occupations are stagnant or declining, including many skilled production occupations. National data on production output show that a small share of firms have been forced to cut back production as a result of worker shortages. Finally, a regional assessment of the manufacturing training pipeline concludes that it is large enough to meet demand, at least through 2016. The manufacturing skills gap in this region cannot be characterized as a widespread worker shortage crisis. This does not mean, however, that it does not deserve the attention of regional leaders from both the public and private sector.

Anecdotal reports from employers seem to indicate that their concerns about the skills gap may be more in anticipation of the future than in current conditions. There is some evidence to support this fear. Due to retirements and increasing demand, shortages of skilled production workers could grow more severe in the not-too-distant future. Firms in the region identified retirements as one of the top three most commonly cited concerns of local manufacturers, and retirements will most heavily affect skilled production workers.<sup>47</sup> Retirements may be more problematic for manufacturing than other industries, because manufacturers rely on work experience to a greater degree than other industries, and work experience is not easily replaced with training. Both the CWWC survey and the Oregon

<sup>47</sup> Gilmore Research Group. (2012). *Manufacturing Workforce Survey*. Portland, OR: Columbia-Willamette Workforce Collaborative. p. 13

Employment Department analysis of difficult-to-fill jobs support this finding: manufacturers favor work experience over certifications, and the most common reason for a difficult-to-fill vacancy is a lack of work experience.<sup>48 49</sup> If manufacturers prefer work experience to formal training, but are not willing or able to provide many opportunities for new entrants to gain work experience, then the public sector training system can only address part of the problem. The training system cannot fully simulate the work experience that manufacturers say they need in qualified candidates. This barrier speaks to the need for deeper engagement by firms in the training system, which we discuss in the next section.

The potential for a spike in retirements as baby boomers age out of the workforce is simultaneous with increasing demand, often termed the “re-shoring” of manufacturing to the U.S. The Boston Consulting Group estimates that increasing demand will require a 27 percent increase in new workers in skilled production roles between 2010 and 2020.<sup>50</sup> During periods of strong demand in the past, manufacturers were more likely to cite labor shortages as a reason for operating below capacity. In the midst of a booming economy in 1999, 20 percent of manufacturers reported that an insufficient supply of local labor was causing them to cut back production.<sup>51</sup> The combination of increasing demand and retirements of experienced workers, who are difficult to replace, make a generalized shortage of skilled production workers more likely in the future.

## 2

### **Challenges may be more severe for a subset of firms and occupations**

The severity of the skills gap is likely to vary substantially across both firms and occupations. A national firm survey found that smaller firms were more likely to report long-term vacancies, difficulty filling positions, and greater impacts on profitability.<sup>52</sup> There is evidence that smaller firms have less capacity to address skill shortages than larger firms: internships are used by only 25 percent of firms with less than 30 employees but by 66 percent of firms with greater than 100 employees.<sup>53</sup> Smaller firms may serve smaller markets, and thus require more specialized skills to work with equipment not widely

48 Gilmore Research Group. (2012). *Manufacturing Workforce Survey*. Portland, OR: Columbia-Willamette Workforce Collaborative. p. 28

49 Nelson, J. (2013). *Two-Fifths of Oregon's Job Vacancies are Difficult to Fill*. Salem, OR: State of Oregon Employment Department. p. 6

50 Boston Consulting Group (2013). *The U.S. Skills Gap: Could it Threaten a Manufacturing Renaissance?* Boston, MA: Author. p. 11

51 Stahl, J. and Morin, N. (2013). *Looking for Shortages of Skilled Labor in the Manufacturing Sector*. Washington D.C.: Board of Governors of the Federal Reserve System. p. 2

52 Osterman, P. and Weaver, J. (2011). Skills and Skill Gaps in Manufacturing. In Locke M. and Wellhausen, R. (Eds.), *Innovation in the Production Economy*. Cambridge, MA: MIT Press.

53 Gilmore Research Group. (2012). *Manufacturing Workforce Survey*. Portland, OR: Columbia-Willamette Workforce Collaborative. p. 30

Smaller firms and more specialized occupations are more likely to experience hiring challenges

used throughout the industry. More generally, smaller firms may operate on leaner profit margins—due to not being able to capitalize on economies of scale—and thus have less room to invest in training or recruitment.

Hiring difficulties and potential shortages seem to vary substantially within skilled production occupations, but the evidence is mixed for some occupations. Several types of machine operators are reported as difficult to fill in statewide surveys, and these same occupations have seen median wage gains in this region, but the regional firm survey found that machine operators were not difficult-to-fill. Computer-controlled machinists and welders are reported as difficult-to-fill in state and regional firm surveys, but have not experienced wage gains over the last decade. A more detailed occupational analysis that attempts to integrate employer survey data with wage trends, occupational demographics and training program completions might provide more actionable insights into the particular labor market dynamics at play within each of these occupations, but that is outside the scope of this paper.

3

### **Hiring difficulties can be driven by human resource practices as well as worker shortages**

Compensation, job structuring, recruiting and screening practices should be examined alongside the training system

There is some evidence from this analysis that the variation in hiring difficulties across firms could be partially attributable to employer human resource strategies and practices. Firms from the region ranked pay and minimal advancement opportunities as the top two reasons why workers left their company.<sup>54</sup> As noted previously, firm's ability to raise wages may be constrained by their competitive environment, and the manufacturing industry is competing with other industries—which may pay higher wages—for some skilled production roles. Still, firms recognize that low pay can be a driver of employee turnover, and median wages for most production jobs in the region have not risen in the past decade. Worker shortages in manufacturing might be reframed as worker shortages at the pay rate that manufacturers are willing or able to pay. Finding a way to raise wages for difficult-to-fill positions may be one component of a strategy to address the skills gap. One way to achieve this effect may be to provide clear internal career pathways for new hires, so even if current wages are not competitive with other industries, expectations of future wage gains may attract new workers.

Recruiting and screening practices may also deserve some attention as one component of a skills gap strategy. Manufacturing firms consistently rank limited work experience as the top barrier to

<sup>54</sup> Gilmore Research Group. (2012). *Manufacturing Workforce Survey*. Portland, OR: Columbia-Willamette Workforce Collaborative. p. 18

finding the right workers. This factor explains 18 percent of the difficult-to-fill vacancies statewide in manufacturing, and was ranked the largest barrier to hiring by 53 percent of firms in the region.<sup>55 56</sup> The U.S. Manufacturing Institute, one of the most prominent voices underscoring a severe shortage of skilled manufacturing workers, recommends that firms expand their candidate pool by “dropping the notion of finding the ‘perfect’ candidate based on a lengthy list of highly specific skills, education and experience.”<sup>57</sup> The industry association goes on to recommend that firms focus on more generalist skills and interpersonal or attitudinal characteristics, echoing an oft-cited business mantra of “hire for attitude, train for skill”. In line with working toward new ways to expand training capacity—which is taken up in the next section—firms should consider expanding their candidate pools as one tool to address hiring challenges.

#### 4

### **The manufacturing skills gap should be reframed as a training gap**

This analysis points to a need to think about the problem of the skills gap in a wider context. The common perception of the skills gap is that not enough workers have the skills that firms need. This framing of the problem tends to focus attention to the deficits of the worker—and the actions workers need to take—and not to the wider economic and social context within which workers are situated.

Firm-based training has declined substantially, yet the public sector may be unable to completely fill the void

The upward trend in workforce challenges of the manufacturing sector might be better understood as a decline in the quality and availability of training, rather than a growing deficit of skills among the workforce. An argument can be made that the basic skill levels of the workforce have remained similar or increased for decades, but the training provided by firms to help people apply those skills has steadily declined.<sup>58</sup> Apprenticeships were one of the main strategies firms used to train new employees in the past, but the widespread decline of unions, who often oversaw these apprenticeship programs, has precipitated a decline in this form of training. Only half of firms in the region use apprenticeships to address skill shortages.<sup>59</sup> About 60 percent of firms use internships, though most are created in collaboration with the university system, so are likely targeted towards engineering and management talent, not skilled production.<sup>60</sup> Ac-

55 Oregon Employment Department. (2013). *Oregon Job Vacancy Survey* (data file).

56 Gilmore Research Group. (2012). *Manufacturing Workforce Survey*. Portland, OR: Columbia-Willamette Workforce Collaborative. p. 32

57 Accenture. (2014). *Out of Inventory: Skills Shortage Threatens Growth for U.S. Manufacturing*. Washington D.C.: Manufacturing Institute. p. 13

58 Cappelli, P. (2012). *Why Good People Can't Get Jobs: The Skills Gap and What Companies Can Do About It*. Philadelphia, PA: Wharton Digital Press. pp. 42-47

59 Gilmore Research Group. (2012). *Manufacturing Workforce Survey*. Portland, OR: Columbia-Willamette Workforce Collaborative. p. 29

60 *ibid.* p. 30

According to the Census data, average annual training per employee across all industries has dropped from about 2.5 weeks in 1979 to just 11 hours in 1995.<sup>61</sup> This drop in training has occurred alongside a rise in the skills required to perform in an increasingly automated manufacturing context. Research on the skills required by new technology in manufacturing has found that skill demands are growing, not at an unmanageable rate, but enough to cause some need for retraining technical skills or more reliable basic math and reading education.<sup>62</sup> Skill demands have grown, but the supply of training has dropped. The skills gap, then, is better understood as a training gap.

This training gap, however, is not simply the result of manufacturers unwillingness to train. In surveys and anecdotal conversations, manufacturers cite intense competitive pressure to keep costs down as the reason for declining investments in training. Competition with low-wage countries forces manufactures to operate on lean profit margins. Rising labor and shipping costs in Asia, and the proliferation of advanced manufacturing processes, has shifted demand back to the U.S., but the momentum to source manufacturing abroad is still strong. Minimizing training costs is one strategy for keeping U.S. manufacturing competitive in this context. Further, companies often see spending resources on training as a risky investment. If a manufacturer invests in training an employee, and that employee leaves, the company sees very little return on investment. It is in the firm's best interest to minimize risk by finding candidates that require the least amount of training. There is a role for the public sector to help mitigate this risk; many developed countries around the world recognize this fact and invest considerable public subsidies in training the workforce with the skills that manufacturing firms need to compete in a global market.

5

### **Employer co-investment may be a promising model for manufacturing workforce strategy**

The public sector is also constrained in its ability to train the manufacturing workforce, however. Demand for skilled production jobs in manufacturing is linked to overall demand for manufacturing. While growth has been relatively strong in recent years, it comes on the tail of many years of decline. As demonstrated by this analysis, accurately measuring both the demand for workers across a range of skilled production occupations and the latent supply already available in the workforce is very difficult. To design a new training program or expand an existing program can take many months or

<sup>61</sup> Cappelli, P. (2012). *Why Good People Can't Get Jobs: The Skills Gap and What Companies Can Do About It*. Philadelphia, PA: Wharton Digital Press. pp. 69-70

<sup>62</sup> Handel, J. (2008). *Measuring Job Content: Skills, Technology, and Management Practices*. Institute for Research on Poverty Discussion Paper no. 1357-08. Madison, WI: University of Wisconsin.

Public sector programs struggle to accurately forecast the number of workers needed and to replicate industry practices that use expensive, ever-changing technology

even years within the community college system, but projecting supply and demand into the future is yet more uncertain in the face of cyclical manufacturing demand as a whole. Further, community colleges often cannot afford to purchase the most up-to-date manufacturing technology, so students learn outdated processes that must be retrained when they enter the workforce. Projecting the number of workers needed across many skilled production occupations and producing workers attuned to the industry practices and technology is an enormous challenge. The public sector must also contend with the risk of mis-allocating investments in training.

This context calls for structures of public and private investment that can respond to localized, occupation-specific shortages and train workers that are attuned to nuanced industry needs while sharing risk across multiple partners. One alternative model that matches these criteria is for multiple employers to co-invest in a training consortium or collaborative in partnership with the public sector, including high schools, community colleges, unions, and non-profit or community organizations. The early stages of one potential manifestation of this model can be seen in the Pathways to Manufacturing program created through a partnership of local manufacturing firms Vigor Industrial and Daimler, local non-profit ImpactNW, and Franklin and Centennial public high schools. ImpactNW helps supplement the human resource capacities of the manufacturing firms by recruiting and screening high school students that have already shown an interest in manufacturing as a career path through engagement in high school shop classes.<sup>63</sup> The manufacturing firms then place students in summer internships working in a real manufacturing environment, and often hire the students into permanent positions at the end of the internship. As a pilot program, the scale is small—only 16 students participated in the first year—and it is too early to assess its effectiveness, but it represents a potentially viable model for employers and the public sector co-investing in a program that can act as an intermediary between industry needs and the workforce as a whole.<sup>64</sup>

The Wisconsin Regional Training Partnership (WRTP) may offer an aspirational model of what the Pathways to Manufacturing program could become. Founded in 1992 in Milwaukee, WRTP is a membership-based consortium of employers, community-based organizations, public agencies and unions. The organization is funded by public, private and philanthropic investments and has over 100 employer and union members.<sup>65</sup> What makes WRTP unique is the wide

63 ImpactNW (2014). *Pathways to Manufacturing*. <http://impactnw.org/ptm/>

64 Goldfield, R. (2013). *Vigor, Daimler go back to high school*. Portland Business Journal.

65 Wisconsin Regional Training Partnership. (2014). *Employer Services, Industry-led Solutions*. <http://www.wrtp.org/employers.php>

range of services it provides to its members, including incumbent worker training, pre-employment or pre-apprenticeship training and certification, partnership with the state's manufacturing extension program to improve business processes in coordination with worker retraining, and public advocacy. Training providers can vary based on where it makes most sense—at a community college, within a firm, or through a union—but WRTP acts as the common intermediary of these efforts. An evaluation of the partnership found the core of its success is in leveraging the efficiencies of employer co-investment oriented around a particular industry sector: (1) economies of scale achieved by spreading the costs of program development and delivery across multiple employers, (2) economies of scope by uniting job-matching, training and business consulting under one intermediary, and (3) positive network externalities generated by information sharing, benchmarking, and identification of best practices.<sup>66</sup> WRTP represents deep engagement of the public and private sectors in a joint effort that goes beyond addressing skill shortages to enhance the competitiveness of firms and economic opportunity for workers.

## THE HEALTHCARE SKILLS GAP

### HOW IS THE HEALTHCARE SKILLS GAP MEASURED?

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#### High demand occupations

Several studies focusing on skills in demand in the healthcare industry do not directly attempt to establish that a skill gap exists; yet they do try to draw attention to increasing demand for middle-skill healthcare occupations. An analysis by the Brookings Institution in July of 2014 points out that healthcare workers with less than a bachelor's degree account for nearly half of the entire healthcare workforce, and this population represents a significant asset for achieving the goals of health system reform.<sup>67</sup> Wages for these occupations closely track educational attainment, indicating that promoting career paths through educational milestones are an effective strategy in the healthcare field, likely because many jobs require legal certification that accompanies educational attainment. These workers are a diverse group; communities of color and women are overrepresented compared to all other pre-baccalaureate occupations, indicating opportunity for self-sufficient wages for historically disadvantaged populations. Pre-baccalaureate jobs are growing faster than post-bacca-

<sup>66</sup> Dresser, L., Rogers, J., Zdrzil, S. (2001). *Wisconsin Regional Training Partnership*. Madison, WI: Center on Wisconsin Strategy.

<sup>67</sup> Ross, M., Prchal Svajlenka, N., and Williams, J. (2014). *Part of the Solution: Pre-Baccalaureate Healthcare Workers in a Time of Health System Change*. Washington D.C.: Brookings Institute.



Reports of occupation that are in high demand do not provide evidence of a skills gap because they overlook the supply of workers

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### Difficult-to-fill vacancies

Technically-oriented occupations tend to be more difficult to fill than healthcare support roles

laureate jobs, but many of the fastest growing occupations are lower wage positions, such as home health aides.

A similar story is told in a recent report for the organization College for America, but this study focuses in on two classes of middle-skill healthcare jobs: nonclinical and frontline workers.<sup>68</sup> Nonclinical occupations include office specialists, office supervisors and medical records technicians. Frontline occupations include medical assistants, community health workers and patient representatives. Technology change, especially electronic health records and coding systems, and health system reform are increasing the complexity of—and driving higher demand for—these jobs. While these reports draw attention to growing and changing occupations, which represent promising opportunities for those without any post-secondary education, they do not connect demand with supply, and thus offer no evidence that abundant job prospects will be available to those who complete training for these occupations.

As discussed above, in relation to the manufacturing industry, the duration of vacancies is often used as a measure of labor shortages; the longer a job takes to fill, the more likely that a shortage exists for that occupation. The Brookings Institution authored a unique analysis of national job vacancy data aggregated by a private firm that uses ads posted on company websites and job boards. The results were starkly different for healthcare practitioner and technical occupations—a category that includes practitioner occupations such as dentists, physicians, physician assistants and registered nurses and technical occupations like lab technologists, EMTs, and medical records technicians—and healthcare support occupations, which include dental, medical and nursing assistants, as well as home health aides. Practitioner and technical occupations were found to have the longest median vacancy duration of 18 days, yet healthcare support occupations, with median vacancy duration of four days, were closer to the average for all occupations.<sup>69</sup>

There is a clear bifurcation within the larger healthcare industry in terms of difficult-to-fill vacancies, and this split holds up even when taking into account educational attainment. In fact, some of the most difficult-to-fill jobs are healthcare practitioner and technical roles that require less than a bachelor's degree. Healthcare practitioner and technical occupations that require a high school education but less than an associates degree are among the most difficult-to-fill jobs across all industries with an average duration of job vacancies

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68 Alssid, J. and Goldberg, M. (2013). *Rise of the Medical Assistant*. Manchester, NH: College for America.

69 Rothwell, J. (2014). *Still Searching: Job Vacancies and STEM Skills*. Washington D.C.: Brookings Institute. p. 10

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## Occupational supply and demand analysis

of 61 days.<sup>70</sup> Associates level occupations in this same group take the longest to fill of all jobs that require an associates degree. If longer vacancies indicate shortages—they might partially indicate employer recruiting practices, as noted above—then middle-skill healthcare practitioner and technical occupations are likely experiencing substantial shortages.

The Oregon statewide 2013 survey of difficult-to-fill jobs, which asks employers directly which jobs were difficult to fill—rather than measuring duration of vacancies—tells a slightly different story: 68 percent of healthcare support jobs were difficult to fill, while only 38 percent of healthcare practitioner and technical jobs were difficult to fill.<sup>71</sup> Much of this variation can be explained by differences between national and state trends in a few key occupations. First, there is likely a far smaller shortage of registered nurses in the state compared to the nation, due in part to the effective response of local colleges and universities to expand the capacity of nursing programs. Registered nurses are by far the largest occupation in the healthcare practitioner and technical occupational category, so it is possible that a smaller shortage in this region could explain most of the difference between national and state data. Secondly, home health aides and massage therapists are almost universally difficult-to-fill in the state, while other healthcare support roles are much easier to fill. Only 29 percent of medical assistant jobs, for example, were difficult to fill, one of the lowest rates among any job with over 200 vacancies.<sup>72</sup>

Some minor inconsistencies between national and state indicators or worker shortages in healthcare lead us to look for evidence at the regional level to triangulate our findings. The CWWC published a report in 2012 that compares supply and demand for the top health care occupations, using program completers as a proxy for the labor market supply. As noted above, there are a number of methodological challenges with this approach, most notably, the number of program completers must be adjusted to account for those who leave the labor force, those who migrate to other industries, and unemployed job seekers, in-migrants, and incumbent workers. Migration to other industries is less important in the healthcare field than manufacturing because educational attainment often goes hand-in-hand with specific, often legally licensed, occupations.

National data indicate that healthcare support jobs are not difficult to fill, but statewide data contradict this finding. A more detailed look at specific occupations on the regional level is consistent with the

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<sup>70</sup> Rothwell, J. (2014). *Still Searching: Job Vacancies and STEM Skills*. Washington D.C.: Brookings Institute. p. 9

<sup>71</sup> Oregon Employment Department (2013). *Annual Job Vacancy Survey* (data file).

<sup>72</sup> Oregon Employment Department (2013). *Annual Job Vacancy Survey* (data file).

The number of people completing training programs is up to six times greater than projected job openings for many healthcare support occupations

national data, and provides convincing evidence that skill shortages are minor among healthcare support occupations, with overtraining occurring for some high demand occupations. The number of program completers is one-and-a-half to six times greater than the number of annual openings for nursing aides, medical assistants, dental assistants, licensed practical nurses, and pharmacy technicians.<sup>73</sup> Many nursing aide completers go straight on to registered nurse programs, however, so the number entering the labor force is lower for that occupation. An important consideration is that these “workforce supply” numbers have not been adjusted for in-migration or unemployed job seekers, so they likely understate supply. As the national analysis of vacancy durations suggested, these healthcare support roles are not difficult to fill, and there is no evidence of a skill shortage. Despite high demand and growth promoted by some national reports, it is more likely that there is a skill surplus for these occupations than a skill shortage.

The state of the skills gap among some other healthcare support occupations is less definitive. Home health aides were found to be almost universally difficult-to-fill jobs in the statewide survey, but because they do not require a post-secondary credential, a supply and demand analysis is less straightforward.<sup>74</sup> The training that is available for home health aides follows a similar curriculum as nursing aides, so they are grouped together in the 2012 CWWC report. With average annual wages of under \$25,000, the potential for self-sufficient incomes is limited.<sup>75</sup> Home health aides can potentially progress into some of the evolving, high demand “frontline” occupations like patient navigators and community health workers, but they will likely need additional education, and may face competition for these jobs from other healthcare support occupations, such as nursing assistants.

Medical office administration, coding and billing positions may present promising opportunities in the healthcare support category. The number of program completers in these occupations is just 38 percent of annual openings, and the occupations are ranked second highest for total demand, behind only registered nurses.<sup>76</sup> A limitation of this measure is that the pool of unemployed job seekers and in-migrants in these occupations could be significantly larger than other healthcare occupations. These positions do not require a license, and the skills are transferable to many other industries, so

<sup>73</sup> Columbia-Willamette Workforce Collaborative (2011). *Regional Healthcare Workforce Report*. Portland, OR: Author. p. 9

<sup>74</sup> Oregon Employment Department (2013). *Annual Job Vacancy Survey* (data file).

<sup>75</sup> Morehead, L. and Martin, S. (2014). *Demographic Analysis of the Manufacturing, Healthcare and Skilled Trades Industries*. Portland, OR: Institute of Portland Metropolitan Studies.

<sup>76</sup> Columbia-Willamette Workforce Collaborative (2011). *Regional Healthcare Workforce Report*. Portland, OR: Author. p. 9

there are fewer barriers to entry. However, as noted in the national report by College For America, these roles are becoming more complex and require specialized skills. Those working in medical administration or billing could potentially progress into a career as a health information technician, a position that the CWWC report notes is heavily recruited outside of the region, an indicator that local supply is insufficient, and thus is likely to offer more stable employment prospects.<sup>77</sup>

There is no significant shortage of registered nurses in the Portland region

The skills gap within the healthcare practitioner and technical occupational category is similarly uneven. Unlike many regions across the country, there is no significant shortage of registered nurses in the Portland area. Colleges and universities in our regions currently train 1.4 registered nurses for every projected opening. Two trends could potentially cause a nursing skills shortage to develop, however. Hospitals and health clinics are increasingly requiring a Bachelor of Science in Nursing in lieu of the previously common associates degree. About two-thirds of 2010 completers were for bachelor's degrees, so the training system is responding to this shift in demand, but it is possible that it will not keep pace, and demand for bachelor's-level nurses will outstrip supply.<sup>78</sup> Additionally, the average age of nurses is relatively older than many other occupations, indicating the potential for shortages caused by retiring baby boomers, mirroring the trend among skilled production workers in manufacturing.

Consistent with the national vacancies analysis authored by the Brookings Institution, a few specific middle-skill healthcare practitioner and technical occupations likely do face an actual skill shortage. The CWWC report notes that EMTs, paramedics, medical technologists, electrocardiograph technicians, medical sonographers and occupational therapist assistants have either program capacity that falls significantly short of local demand, or no training program is available for that occupation in the region.<sup>79</sup> These occupations account for just 7 percent of annual openings among the top healthcare occupations, however; so though a skills shortage does exist, the opportunity for these jobs to provide pathways to self-sufficiency is relatively limited.<sup>80</sup>

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77 Columbia-Willamette Workforce Collaborative (2011). Regional Healthcare Workforce Report. Portland, OR: Author. p. 12

78 Columbia-Willamette Workforce Collaborative (2011). Regional Healthcare Workforce Report. Portland, OR: Author. p. 9

79 *ibid.* p. 9-11

80 *ibid.*

## WHAT DOES THE EVIDENCE TELL US ABOUT THE HEALTH-CARE SKILLS GAP?

1

### **Skill surpluses may be more damaging than skill gaps**

While much popular attention has focused on the “nursing crisis,” a generalized shortage of healthcare workers, or simply the high demand for some healthcare jobs —as in the national report titled *Rise of the Medical Assistant*—little attention has focused on the issue of overtraining in some occupations. Several healthcare support roles are in significant oversupply, especially medical assistants, pharmacy technicians, dental assistants, nursing aides and licensed practical nurses. As explained below, private for-profit colleges are the major contributors to this oversupply, creating challenges both for those who graduate from these programs today and into the future, as the latent supply of unemployed workers in these occupations is likely to be quite large.

Private, for-profit colleges train the great majority of people entering occupations that may be in oversupply

An analysis by the Center for American Progress found that private, for-profit colleges train 88 percent of all medical assistants, 71 percent of dental assistants and 76 percent of pharmacy technicians.<sup>81</sup> Unlike nursing, emergency medical care, or diagnostic technician occupations, these jobs cost relatively little to train, and can easily be trained in the popular online format. Yet, average tuition at for-profit colleges is two times greater than not-for-profit institutions.<sup>82</sup> There is considerable evidence that these occupations are over-trained, largely by private colleges, and employment prospects for those trained in these occupations will be challenging. While demand is projected to continue to grow for these occupations, and their skill content is expanding, those interested in these jobs should closely monitor the job placement performance of potential training programs. They might also consider gaining additional skills to differentiate themselves, such as electronic health records technology or community health promotion and education.

2

### **Skill shortages are more likely in technician and community-oriented roles**

A thread running throughout this analysis is the bifurcation of the health care skills gap. Generally speaking, skill shortages grow in line with educational attainment. Some of this difference can be explained by legal licensing requirements, which tend to restrict supply by presenting a barrier to entry for some occupations. More broadly, practitioner and technician jobs, which typically require more

<sup>81</sup> Morgan, J.M. and Whelan, E.M. (2011). *Profiting from Health Care: The Role of For-Profit Schools in Training the Health Care Workforce*. Washington D.C.: Center for American Progress. p. 15

<sup>82</sup> *ibid.* p. 24

education than healthcare support roles, are more likely to have skill shortages, and thus present more promising employment opportunities. Technician occupations for which an associates degree is either required or makes a candidate more competitive, such as radiologic technicians, medicalsonographers, laboratory technicians, paramedics, occupational and physical therapy technicians, and health information technicians, are positions that are more likely to experience supply that lags behind demand. This is also true for registered nurses, the largest healthcare occupation, yet demand is shifting from the associates degree level to the bachelor degree level. Fortunately, many healthcare careers offer clear educational pathways, which often build upon previous coursework and allow transfers of credits, so individuals can progress into occupations with more stable employment conditions and higher wages.

Health system reform, electronic health records and demographic change could increase or shift skill demands

Three significant trends are identified across healthcare workforce research that could potentially expand the size of the skills gap, shift the skill composition of certain occupations, or introduce new occupations. Nationwide adoption of electronic health records is underway, and two-thirds of regional employers plan to seek outside help to facilitate this transition.<sup>83</sup> A related trend is the adoption of a new medical coding standard known as ICD-10. Occupations that currently do not require extensive computer skills, knowledge of electronic health records software, or coding languages, may require skill upgrades. Perhaps more importantly, demand is likely to grow for health records technicians and other medical administration roles. Health system reform is the source of the second trend, both nationally and in the state of Oregon, toward community-based care, also known as Coordinated Care Organizations. Community health workers and patient navigators are likely to see growth in demand, with a similar skill set to many current occupations but an expanded focus to include health promotion, education and long-term case management. Lastly, a retirement boom will drive up demand in some occupations, perhaps most acutely among registered nurses, who are older on average than many other middle-skill healthcare occupations.

<sup>83</sup> Columbia-Willamette Workforce Collaborative (2011). *Regional Healthcare Workforce Report*. Portland, OR: Author. p. 15

## CONCLUSIONS

The purpose of this review was to assess the available evidence for a shortage of middle skill workers in the manufacturing and health-care industries in this region. The skills gap in these industries is multi-faceted and dynamic. This particular narrative attempts to integrate data and evidence from multiple sources to offer a fuller picture of the labor market and training systems of these industries. As with any narrative, however, it is bound to be incomplete—it will leave out important factors and viewpoints, and we welcome feedback from the community. This analysis identified seven key findings that follow from a review of the literature and data on the skills gaps in manufacturing and healthcare:

### MANUFACTURING

- 1** **Shortages of skilled production workers may be less severe than often claimed, but could grow more severe in the future.** Definitive evidence is not found for widespread shortages of skilled production workers in the manufacturing industry in this region. Retirements and increasing domestic demand for manufacturing could lead to more severe and widespread shortages in the future, however.
- 2** **Challenges may be more severe for a subset of firms and occupations.** There is substantial variation across employer survey and wage data that indicates that some firms face more challenges than others, and some occupations are more difficult-to-fill than others. More detailed analysis of occupations is needed to make any conclusive statements about certain occupations, but there are methodological uncertainties to this type of analysis.
- 3** **Hiring difficulties can be driven by human resource practices as well as worker shortages.** Manufacturers are constrained in their ability to raise wages, expand recruiting practices, or design internal pathways of advancement, though these may be important components of addressing hiring difficulties. Where possible, firms should consider expanding their candidate pool rather than waiting for the perfect candidate.
- 4** **The manufacturing skills gap should be reframed as a training gap.** The skills gap tends to focus attention on the deficits of the worker and away from the wider social and economic system within which workers are situated. A more useful framing of the problem is a “training gap”, which refocuses attention to the challenges confronted by both the private and public sector to efficiently allocate training investments in a globalized and highly competitive industry.

- 5** **Employer co-investment is a promising model for manufacturing workforce strategy.** Given the constraints and challenges faced by the industry, employer co-investment in training offers a promising path forward for the regional manufacturing industry to not only address skill shortages, but to enhance competitiveness for firms and increase economic opportunity for workers.

## HEALTHCARE

- 1** **Skill surpluses may be more damaging than skill gaps.** National and regional data suggest that several healthcare support occupations have a surplus of workers. Policymakers and other workforce actors should take caution in promoting enrollment in these training programs, and should further analyze the labor market prospects for recent program completers.
- 2** **Skill shortages are more likely in technician and community-oriented roles.** While nursing shortages are not a reality in this region, several other middle-skill practitioner and technician occupations are short on workers and present promising career pathways. Additionally, skill shortages may grow in the future due to the increasing complexity of healthcare work as a result of health system reform, new coding languages and electronic health records.



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